

CLAIMS

1. A method of attaching a seat belt to a seat belt tension sensor, comprising:
 - a. placing a webbing of the seat belt through an opening in the seat belt tension sensor, wherein said opening extends through a first portion of the seat belt tension sensor and through a carriage of the seat belt tension sensor that is adapted to move relative to said first portion of said seat belt tension sensor responsive to a tension load applied to said webbing, wherein said opening through said first portion of the seat belt tension sensor is narrower than a nominal width of said webbing; and
 - b. preventing said webbing from generating a non-negligible force over a measurement range as a result of rubbing against a lateral side of said opening in said first portion of the seat belt tension sensor responsive to said tension load applied to said webbing.
2. A method of attaching a seat belt to a seat belt tension sensor as recited in claim 1, wherein the operation of preventing said webbing from generating a non-negligible force over a measurement range as a result of rubbing against a lateral side of said opening comprises constraining a width of a portion of said webbing along the seat belt tension sensor to be narrower than a width of said opening in said first portion of the seat belt tension sensor.
3. A method of attaching a seat belt to a seat belt tension sensor as recited in claim 2, wherein the operation of constraining the width of a portion of webbing along the seat belt tension sensor to be narrower than the width of said opening in said first portion of the seat belt tension sensor comprises adapting said opening in said first portion of the seat belt tension sensor to be sufficiently wider than opening of carriage so as to prevent said webbing from contacting a side of said opening in said first portion of the seat belt tension sensor responsive to said tension load applied to said webbing.

4. A method of attaching a seat belt to a seat belt tension sensor as recited in claim 2, wherein the operation of constraining the width of a portion of webbing along the seat belt tension sensor to be narrower than the width of said opening in said first portion of the seat belt tension sensor comprises:
 5. a. bunching or folding a portion of said webbing adjacent to the seat belt tension sensor so that said portion of said webbing that is bunched or folded is narrower than said opening in said first portion of the seat belt tension sensor; and
 - b. maintaining said portion of said webbing in a bunched or folded condition, wherein said portion of said webbing comprises a first portion and a second portion, said first portion is adjacent to a first side of the seat belt tension sensor, said second portion is adjacent to a second side of the seat belt tension sensor, and said second side is opposite to said first side.
10. 5. A method of attaching a seat belt to a seat belt tension sensor as recited in claim 4, wherein the operation of maintaining said portion of said webbing in a bunched or folded condition comprises sewing said bunched or folded first and second portions of said webbing together at a location beyond a restraining end of the seat belt tension sensor.
6. A method of attaching a seat belt to a seat belt tension sensor as recited in claim 4, wherein the operation of maintaining said portion of said webbing in a bunched or folded condition comprises sewing said bunched or folded first portion of said webbing at a first location beyond said opening in said first portion of the seat belt tension sensor so as to maintain said first portion in a bunched or folded condition, and sewing said bunched or folded second portion of said webbing at a second location beyond said opening in said first portion of the seat belt tension sensor so as to maintain said second portion in a bunched or folded condition.
5. 7. A method of attaching a seat belt to a seat belt tension sensor as recited in claim 4, wherein the operation of maintaining said portion of said webbing in a bunched or folded condition comprises locating said bunched or folded first and second portions of said webbing within at least a portion of a ring located beyond the seat belt tension sensor.

8. A method of attaching a seat belt to a seat belt tension sensor as recited in claim 4, wherein the operation of maintaining said portion of said webbing in a bunched or folded condition comprises locating said bunched or folded first portion of said webbing within at least a portion of a first ring located beyond said opening in said first portion of the seat belt tension sensor, and locating said bunched or folded second portion of said webbing within at least a portion of a second ring located beyond said opening in said first portion of the seat belt tension sensor.
9. A method of attaching a seat belt to a seat belt tension sensor as recited in claim 8, further comprising separating said at least portions of said first and second rings at a location beyond the seat belt tension sensor by a distance at least as great a thickness of said seat belt tension sensor sufficient to prevent said webbing from generating a non-negligible force over a measurement range as a result rubbing against an outer surface of said first portion of the seat belt tension sensor responsive to said tension load applied to said webbing.
10. A method of attaching a seat belt to a seat belt tension sensor as recited in claim 2, wherein the operation of constraining the width of a portion of webbing along the seat belt tension sensor to be narrower than the width of said opening in said first portion of the seat belt tension sensor comprises at least partially enclosing said portion of said webbing with a sleeve that extends through said opening and is adapted to engage the carriage of the seat belt tension sensor.
11. A method of attaching a seat belt to a seat belt tension sensor as recited in claim 10, wherein at least a portion of said sleeve proximate to an outside surface of said first portion of the seat belt tension sensor comprises a relatively low-friction material.
12. A method of attaching a seat belt to a seat belt tension sensor as recited in claim 10, wherein said sleeve is adapted so as to be free of contact of said first portion of the seat belt tension sensor responsive to said tension load applied to said webbing.
13. A method of attaching a seat belt to a seat belt tension sensor as recited in claim 1, further comprising preventing said webbing from generating a non-negligible force over a measurement range as a result of rubbing against an outer surface of said first portion of the seat belt tension sensor responsive to said tension load applied to said webbing.

14. A method of attaching a seat belt to a seat belt tension sensor as recited in claim 13, wherein the operation of preventing said webbing from generating a non-negligible force over the measurement range as a result of rubbing against an outer surface of said first portion of the seat belt tension sensor comprises engaging a portion of said webbing with a thimble, wherein said thimble is adapted to engage said carriage of the seat belt tension sensor.
- 5 15. A method of attaching a seat belt to a seat belt tension sensor as recited in claim 14, wherein said thimble is adapted so as to be free of contact with said first portion of the seat belt tension sensor responsive to said tension load applied to said webbing.
16. A method of attaching a seat belt to a seat belt tension sensor as recited in claim 13, wherein the operation of preventing said webbing from generating a non-negligible force over the measurement range as a result of rubbing against an outer surface of said first portion of the seat belt tension sensor comprises engaging a portion of said webbing with a thimble portion of said carriage that extends beyond said opening of said first portion of the seat belt tension sensor.
- 5 17. A method of attaching a seat belt to a seat belt tension sensor as recited in claim 13, wherein the operation of preventing said webbing from generating a non-negligible force over the measurement range as a result of rubbing against an outer surface of said first portion of the seat belt tension sensor comprises interposing a relatively low friction material at a location of sliding contact between said webbing and the seat belt tension sensor.
18. A method of attaching a seat belt to a seat belt tension sensor as recited in claim 13, wherein the operation of preventing said webbing from generating a non-negligible force over the measurement range as a result of rubbing against an outer surface of said first portion of the seat belt tension sensor comprises spreading said webbing with a flange operatively coupled to said carriage, wherein said flange extends beyond an outer surface of said first portion of the seat belt tension sensor.

19. A carriage of a seat belt tension sensor, wherein said carriage is adapted to engage a webbing of a seat belt and said carriage is adapted to move relative to a first portion of the seat belt tension sensor in opposition to at least one spring acting between said first portion of the seat belt tension sensor and said carriage, whereby the amount of movement is responsive to a tension in the seat belt, said carriage comprising:

- 5 a. an opening adapted to receive the webbing of the seat belt, wherein said opening cooperates with a corresponding opening in said first portion of the seat belt tension sensor; and
- 10 b. a protrusion extending from said carriage, wherein with said carriage is installed in the seat belt tension sensor, said protrusion extends beyond an outer surface bounding said first portion of the seat belt tension sensor and spanning across said opening in said first portion of the seat belt tension sensor.

20. A carriage of a seat belt tension sensor as recited in claim 19, wherein said protrusion comprises at least one flange.

21. A carriage of a seat belt tension sensor as recited in claim 20, wherein said opening in said carriage is sufficiently narrower than said corresponding opening in said first portion of the seat belt tension sensor so as to prevent said webbing from rubbing against a side of said corresponding opening in said first portion of the seat belt tension sensor responsive to a tension load applied to said webbing.

5 22. A carriage of a seat belt tension sensor as recited in claim 19, wherein said protrusion comprises a thimble portion.

23. A carriage of a seat belt tension sensor as recited in claim 22, wherein said thimble portion comprises a groove, said groove is adapted to receive a portion of said webbing of said seat belt, and said thimble portion and said groove are adapted to prevent said webbing from contacting a side of said opening in said first portion of the seat belt tension sensor responsive to a tension load applied to said webbing.

5 24. A carriage of a seat belt tension sensor as recited in claim 22, wherein said thimble portion comprises a groove, said groove is adapted to receive a portion of said webbing of said seat belt, and said thimble portion and said groove are adapted to prevent said webbing from contacting a surface of said first portion of the seat belt tension sensor responsive to a tension load applied to said webbing.